

Safe Work Practices

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Los Alamos National Laboratory

Laboratory Implementation Requirements LIR300-00-01.4

Issue Date:

1.0 Introduction

1.1 Background

Safe work practices are an essential part of Integrated Safety Management (ISM) at Los Alamos National Laboratory (Laboratory) and apply to issues of environment, safety and health. Safe work practices require defining the work; establishing, documenting, and maintaining an effective hazard- control system within which the work is performed; and authorizing both the defined work and the workers to perform the work. Integrating safe work practices with work activities requires workers and their line managers/supervisors to use a systematic, tailored approach and good judgment in applying their knowledge of the work to identifying hazards and controls so that the work can be performed safely.

This document describes the process for developing and implementing safe work practices for non-facility work (see Sec. 6.0) in relation to the five core functions of ISM at the activity level:

- Define the work.
- Identify and evaluate hazards.
- Develop and implement controls.
- Perform work safely.
- Provide feedback and continuous improvement.

Specific requirements on the work of equipment-service contractors are also included. Accordingly, this document replaces Notice 10.

1.2 In this Document

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2.0 Purpose

The purpose of this document is to describe, document, and communicate safe work practice requirements for the Laboratory. These requirements define the systematic process for establishing, documenting, and maintaining a hazard-control system and the roles and responsibilities of those who perform and/or authorize work.

3.0 Scope

The provisions of this document apply to all Laboratory employees and to contractor and subcontractor employees and visitors who perform non-facility-related work at the Laboratory.

4.0 Definitions

acceptable risk—The level at which the benefits of the work outweigh the risk posed, and the risk is reduced to a level as low as is reasonably achievable.

administrative control—A method such as a procedure, permit, sign, access restriction, time limitation, or training that directs, restricts, or modifies people's behavior.

authorization—The acceptance and approval by the appropriate level of supervision of (1) the adequacy of the control system [work authorization] or (2) a specific worker's knowledge, skills, and abilities to perform the work safely [worker authorization].

change-control process—A process by which changes in configurations or procedures are appropriately documented and communicated to affected personnel.

control—A method or means used to mitigate hazards and reduce risk.

elimination—The removal of a hazardous material, condition, or process.

engineering control—A structural or mechanical device or system such as a fume hood, glove box, ventilation system, interlock, shielding, or remote handling.

environment, safety, and health (ES&H) subject-matter expert—Any individual with academic credentials, work experience, or extensive knowledge in an ES&H discipline (for example, industrial hygiene, industrial safety, health physics, or environmental protection) or in controlling the specific hazards associated with the defined work.

equipment-service contractor—The employee of an external organization who is engaged by the Laboratory to install, maintain, modify, or remove equipment (for example, an electron microscope service contractor or a copy machine repair person.)

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4.0 Definitions (continued)

equivalent position—A supervisory or management position with comparable responsibilities and authorities. For example, a Center Leader is an equivalent position to a Group Leader.

facility work—Any combination of engineering, procurement, erection, installation, assembly, disassembly, or fabrication activities involved in creating a new facility or in maintaining, altering, adding to, decontaminating, decommissioning, or rehabilitating an existing facility (as defined in LIR230-03-01, “Facility Management Work Control”).

hazard—Any source or situation with potential to cause injury or harm to workers or the public, harm to the environment or incurred liability, or damage to or loss of property.

hazard-control plan—A document that, at a minimum, defines the work, identifies the hazards associated with the work, and describes the controls needed to reduce the risk posed by the work to an acceptable level.

hazard-control system—The combination of controls established to reduce the risk posed by the work to an acceptable level.

Independent peer—An individual who is familiar and knowledgeable about the specific type of work being done and the associated hazards with that type of work. This individual would not have been involved with the original hazard evaluation or the development of controls, and is not directly involved with performing the work. This independence is important for providing a critical and unbiased review of the adequacy of the hazard identification and evaluation and the controls employed to mitigate those hazards.

initial risk—The risk before controls are established and in place, or the risk posed by hazards that have not been adequately controlled; for activities with established control systems, the risk before Laboratory-instituted controls are implemented, or the risk posed because of the likelihood of failure of the established controls.

line manager—Any formally designated manager, such as a group leader or division director, who is responsible for Laboratory workers’ terms and conditions of employment.

personal protective equipment—Protective devices such as gloves, coveralls, safety shoes, respirators, safety glasses, or ear plugs worn by the workers.

residual risk—The risk remaining after controls are in place, with consideration of the reliability and certainty of the controls and risk of control failure.

risk—A function of the likelihood and potential severity of injury, harm, incurred liability, damage, or loss; for the purpose of this document, a qualitative judgment based on knowledge and experience.

substitution—The replacement of a hazardous material, condition, or process with a less hazardous material, condition, or process.

supervisor—Any individual, such as a team leader, group leader, or division director, with the authority and responsibility to direct and authorize the activities of workers.

worker—Any Laboratory employee; any contract employee, subcontract employee, or visitor, while they are performing work at the Laboratory.

5.0 Responsibilities

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5.1 Workers

Workers, with assistance as needed, are responsible for

- defining the components of and the processes associated with the work in sufficient detail to enable hazards to be identified and adequately controlled;
 - identifying and evaluating the hazards associated with the work, as necessary, to ensure that the controls are adequate to perform the work safely;
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5.1 Workers (cont.)

- defining, establishing, and maintaining, as assigned, a hazard-control system that effectively mitigates the hazards associated with the work and meets institutional and facility requirements;
 - determining that the work has been authorized before proceeding with it;
 - acquiring the knowledge and skills needed to perform the work safely;
 - obtaining and maintaining authorization to perform the work;
 - understanding and following all operational requirements and restrictions related to the work;
 - performing the work safely;
 - improving the safety of the work by reviewing the work, commensurate with the level of risk, and incorporating lessons learned; and
 - using an appropriate change-control process to document and communicate changes made in the hazard-control system.
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5.2 Line Managers/ Supervisors

Line managers/supervisors are responsible for

- defining the scope of the work;
 - ensuring that an effective hazard-control system is established to reduce the risk posed by the work to an acceptable level;
 - a periodic review, at the division level, of the process used to assign and mitigate initial risk;
 - ensuring that institutional and facility requirements and restrictions on the work are followed;
 - understanding the work and associated hazard control system sufficiently to judge the acceptability of the residual risk prior to authorizing that work;
 - authorizing the defined work, when the risk has been controlled to an acceptable level;
 - ensuring that workers have the knowledge, skills, and abilities needed to perform the work safely;
 - authorizing workers to perform the work, when they have adequate knowledge, skills, and abilities;
 - ensuring that workers perform the work safely;
 - improving the safety of the work by reviewing the work, commensurate with the level of risk, and ensuring the incorporation of lessons learned; and
 - ensuring that an appropriate change-control process is used to document and communicate changes made in the hazard-control system.
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- 5.3**
ES&H
Subject-Matter
Experts
- ES&H subject-matter experts are responsible for
- providing assistance, as needed, in identifying and evaluating hazards and in developing and evaluating controls; and
 - determining, with line managers and supervisors, the adequacy of the controls, as appropriate for the level of risk.
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6.0 Precautions and Limitations

This document establishes the basic requirements for safe work practices at the Laboratory and does not address all statutory, regulatory, contractual, institutional, facility, or activity requirements. Nor does it address facility work, which is defined as any combination of engineering, procurement, erection, installation, assembly, disassembly, or fabrication activities involved in creating a new facility or in maintaining, altering, adding to, decontaminating, decommissioning, or rehabilitating an existing facility. The requirements for facility work are addressed in LIR230-03-01, “Facility Management Work Control.”

7.0 Safe Work Practice Requirements

- 7.1**
Define the
Work
- The work components and processes must be defined in sufficient detail to enable the hazards and the situations or circumstances in which they could cause harm to be identified and evaluated. Workers and supervisors must define the work by identifying factors such as
- the specific activities, their sequence, and their duration;
 - the configuration and use of the equipment;
 - the workers involved in the work;
 - the constraints of the facility and/or location, in which the work will be performed;
 - effects on the environment, facility, and people in the vicinity; and
 - legacy issues associated with the work.

For equipment-service contractor work, Form 2011 – Facility Impact Questionnaire (see [OST 300-00-01](#)) must be completed and submitted with the procurement request to ensure that contracted work that may impact the facility is reviewed by facility management.

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7.2 Identify and Evaluate Hazards

Hazards and the situations or circumstances in which they could cause harm must be identified and evaluated to determine whether controls are needed to reduce the risk to an acceptable level. Workers and supervisors must identify and evaluate hazards associated with the work activities, with assistance, as needed, from ES&H subject-matter experts and other knowledgeable resources, by doing the following:

- Use their knowledge of the work activities to systematically identify the hazards associated with the work. The goal is to identify all the conditions that could cause injury or harm to workers, the public, or the environment, or damage to or loss of property.
- Evaluate the hazards associated with the work and determine their likelihood and severity (that is, risk). The goal is to determine the level of risk posed and the rigor needed to ensure that the risk is controlled to an acceptable level.

For equipment-service contractor work, Form 1664 (see [OST 300-00-01](#)) must be completed and submitted with the procurement request to ensure that appropriate information regarding site-specific hazards, institutional or site-specific controls, and access control is transmitted to the service contractor.

7.3 Develop and Implement Controls

Controls must be defined (or developed) and implemented, as needed, to reduce the risks associated with the work to an acceptable level.

7.3.1 Development. Workers and supervisors must define (or develop) and implement controls for the identified hazards, with assistance, as needed, from ES&H subject-matter experts and other knowledgeable resources, by doing the following:

- Identify institutional, facility, and activity requirements. The goal is to identify all Laboratory ES&H requirements applicable to the work.

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- Develop and implement controls, as needed, based on the outcome of the hazard evaluation. As appropriate for the work, use the following preferred hierarchy of controls: elimination, substitution, engineering controls, administrative controls, and personal protective equipment. The goal is to reduce the risk to an acceptable level.
- Identify the knowledge, skills, and abilities needed by the workers and the training required to handle the hazards and effectively use the controls. The goal is to ensure that workers are adequately prepared to perform the work safely.
- Analyze, with a rigor commensurate with the level of risk, potential failures of controls, equipment, utilities, facility systems, procedures, or human factors; estimate the risk of such failures; and consider enhancements and/or alternatives as needed. The goal is to identify weaknesses in the overall system that could cause injury, harm, damage, or loss and modify the system to reduce the risk to an acceptable level.

Guidance Note: For any given activity, the initial risk determined for safe work practices is not always the same as that determined for safety basis purposes. Hazard controls that have been approved by a nationally recognized product testing and safety organization, such as Underwriters Laboratories, or that have been rigorously reviewed and incorporated in equipment by a reputable commercial supplier can be credited in determining initial risk under safe work practices. In contrast, formal and quantitative hazards analyses conducted for safety basis purposes begin with the unmitigated—or intrinsic—risk of an activity to determine the necessary controls.

- Obtain a review of the controls developed or modified, based on the initial risk, as determined by the risk model in Section 8.0 and in accordance with the review table below.

Initial Risk Level	Review Required
High	Concurrence of ES&H subject-matter expert(s) and independent peer(s)
Medium	Consultation with ES&H subject-matter expert(s) and/or independent peer(s)
Low or Minimal	None

- Develop emergency actions to follow in the event of a system failure or accident.

7.3.2 Documentation. Workers and supervisors must appropriately document the hazard-control system.

- When new controls are developed or existing controls are modified, document the defined work, the hazards identified, the risks posed, and the controls established in a hazard-control plan.
 - When existing controls reduce the risks to acceptable levels, operating manuals or other established documents that govern the use of the equipment or process provide sufficient documentation. (This applies to commercial equipment and Laboratory control systems that have been previously established and reviewed.)
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7.3 Develop and Implement Controls (cont.)

7.3.3 Authorization of Work. The defined work must be authorized by the appropriate level supervisor or line manager. The workers must determine that the work is currently authorized before performing the work.

- Authorization of the work is based on the residual risk, which includes the reliability and certainty of the controls to maintain an acceptable level of risk, the consequences and likelihood of control failure, and the adequacy of the controls to meet institutional, facility, and activity requirements.
- Authorization of the work is granted (and documented in writing when controls are developed or modified), in accordance with the risk determination model in Section 8.0 and the authorization table below. (Supervisors and line managers defer to a higher management level if unsure about authorizing the work.)

Residual Risk Level	Authorization Required
High	Work will not be authorized or performed
Medium	Division director (or equivalent position)
Low	Group leader (or equivalent position)
Minimal	Supervisor

- The hazard control system for an activity must be in place and verified to be functional prior to work authorization. The initial authorization for an activity constitutes the certification of readiness of the work to be performed.
- Work authorizations must be reviewed and renewed periodically with a frequency that is commensurate with the level of residual risk. This review must be performed by the appropriate level supervisor or line manager as specified in the table above.

7.3.4 Authorization of Workers. Workers must obtain authorization to perform the work.

- Authorization of workers shall be granted when their knowledge, skills, and abilities are sufficient to perform the work safely. The authorization of a worker constitutes the certification of his or her readiness to perform the work.
- Authorization of workers engaged in low or medium residual risk work is granted in writing by their line manager. Authorization of workers engaged in minimal residual risk work is granted by their supervisor.
- Authorizations must be reviewed and renewed periodically, commensurate with the level of risk, but at least annually.

For equipment-service contractor work, the procurement specialist, responsible for the contract, must obtain the service contractor signature on Form 1666 (see [OST 300-00-01](#)), to certify their compliance with Laboratory expectations for the work, prior to the start of work. In addition, the requestor shall be responsible for ensuring that the service contractor is advised of any institutional ES&H requirements, including training, as well as any facility-specific access and ES&H requirements. If a Labwide contract is already in place for non-facility-related equipment (e.g. certain copy machines), the requestor must notify the service contractor in writing of any site hazards/controls that may affect their work.

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7.4

Perform Work Safely

Work must be performed safely. Workers must do the following:

- Perform a self-readiness check, commensurate with the level of risk, before each day's activities to verify that work conditions have not changed, that controls are in place and functional, that the equipment status is appropriate for performing the work safely, and that authorizations are current. If the control system is inadequate for the work to be performed safely, an effective control system must be established, using the process defined in this LIR, before the work is begun.
 - Perform work safely by using the established hazard-control system.
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7.5

Provide Feedback and Continuous Improvement

Feedback on the adequacy of the controls and opportunities for improvement must be provided to maintain safe operations. Workers and supervisors must do the following:

- Periodically review the work, commensurate with the level of risk, to evaluate whether changes in the work scope, hazards, or other conditions warrant revision of the hazard-control system.
 - Periodically re-evaluate the effectiveness of the controls and use lessons learned from control failures, near misses, or accidents to improve the hazard-control system.
 - Develop and use a change-control process, with a rigor commensurate with the level of risk, to document changes in the hazard-control system and inform workers and other impacted people of those changes.
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8.0 Risk Determination

The matrix below represents a model of risk as a function of likelihood and severity. Note: The likelihood categories represent a continuous gradation from left to right in each column.

	Likelihood				
Severity	Frequent usual occurrence <i>to</i> likely occurrence, reasonably expected	Probable likely occurrence <i>to</i> irregular occurrence, infrequent	Occasional irregular occurrence, infrequent <i>to</i> slight chance of occurrence	Improbable slight chance of occurrence <i>to</i> highly unlikely occurrence	Remote highly unlikely occurrence <i>to</i> extremely unlikely occurrence
Catastrophic death, severe injury/ occupational illness, severe environmental harm or liability, or severe property damage	High	High	High	Medium	Low
Critical major injury/ chronic impairment or occupational illness, major environmental harm or liability, or major property damage	High	High	Medium	Low	Minimal
Moderate minor injury/ temporary impairment or occupational illness, minor environmental harm or liability, or minor property damage	High	Medium	Low	Minimal	Minimal
Negligible less-than-minor injury or occupational illness, less-than-minor environmental harm or liability, or less-than-minor property damage	Low	Minimal	Minimal	Minimal	Minimal

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9.0 References

- 9.1 Source Documents** “Integrated Safety Management,” Los Alamos National Laboratory document, November 1996.
- “Safety Management System Policy,” U.S. Department of Energy, DOE P450.4, October 1996.
- “System Safety Program Requirements,” U.S. Department of Defense, MIL-STD-882C, January 1993.
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- 9.2 Document Coordination** The Materials Science and Technology Division Office is the office of institutional coordination responsible for developing, revising, and maintaining the contents of this document.
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